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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/783,059	02/14/2001	Tapani Ryhanen	297-010113-US(PAR)	9629

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EXAMINER

BETTENDORF, JUSTIN P

ART UNIT PAPER NUMBER

2817

DATE MAILED: 05/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/783,059

Applicant(s)

RYHANEN ET AL

Examiner

Justin P. Bettendorf

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 February 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the adjustable inductor with several coil segments and MEMS as recited in claims 21-23 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction in red ink or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

In the present case, the abstract should be directed solely to the claimed invention of a tunable RF resonator and tunable capacitor (no method).

Claim Objections

3. Claims 16 and 17 are objected to because of the following informalities: These claims appear to be a Markush group but are not written in that format (i.e. --consist-- instead of "comprise"). Appropriate correction is required.

4. Applicant is advised that should claim 33 be found allowable, claim 42 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing,

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despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-24, 28, 33, 37, and 42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites that there is a "second conducting layer and a third conducting layer" which is confusing because, as disclosed in the specification and recited in claim 4, these layers are the same.

Also, claim 7 recites "the substrate dielectric insulating layer" which lacks an antecedent basis.

7. Regarding claims 16-18, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

8. Claims 28 and 37 each recite "the said electrode" which lacks a clear antecedent basis.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 25-28, 31, 32, 34-37, 40, and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishige et al. EP 0 725 408 A2 (cited by the applicant).

Figures 14(a), (b) show the claimed micro-mechanical tunable capacitor that includes: a flexible, active electrode 14 (capable of receiving an RF signal); counter-electrode 4 closer to electrode 14 than tuning electrodes 10 and electrodes 13/14. The substrate 9 is made of glass (col. 15, lines 35-53). The active electrode is positioned in the middle, farther from the sides than tuning electrodes 10. With respect to claims 28 and 37, the electrodes are made of thin-film Al (col. 1, lines 17-19 and col. 6, lines 34-36).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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13. Claims 29, 30, 38, 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishige et al.

The Ishige et al. reference discloses a tunable micro-mechanical capacitor with a thin connecting portion 15 that goes from two levels and acts as spring (see col. 13, lines 23-25). However, the reference does not explicitly show folded-over or corrugated structure.

Nevertheless, such structures are well known for springs.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the well-known corrugated spring structure in place of the spring structure 15 because such a modification would have been considered a mere substitution of art-recognized equivalent spring structures.

14. Claims 1-21, 24, 33, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tham et al. United States Patent No. 6,049,702 in view of Ishige et al.

Figure 5a of Tham et al. shows a resonator with variable inductor and capacitor which uses MEM technology (col. 6, lines 60-68). Figures 6g and 7g show a combined capacitor/inductor resonator with planar inductor having turns 164 on a certain layer and capacitor electrodes on other layers with 153 providing connection between the capacitor and the inductor (see col. 8, lines 31-55). However, the embodiment of figure 5a shows a switched variable capacitor instead of the claimed structure.

Nevertheless, as noted above, the Ishige et al. reference teaches the claimed variable capacitor that includes insulation films on the parts of the electrode that may touch (see cols. 13, 14 lines 58, 59 and 1-5). Such a variable capacitor advantageously takes less substrate space than multiple switched capacitors, as would have been well known.

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Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the art-recognized equivalent variable capacitor of Ishige et al. in place of the switched variable capacitor in the resonator of Tham et al. because such a substitution of art-recognized equivalent variable capacitors would have taken up less substrate space thereby suggesting the obviousness of the modification.

With respect to claim 4 (i.e. same layer), such a modification would have been obvious *JB* based on well-known manufacturing practices. *(see col. 9, 63-68)*

With respect to suspended capacitors/inductors (e.g. claims 5-7), such an arrangement is conventional in order to reduce parasitics.

With respect to the material of the isolation film (e.g. claims 12 and 13), both silicon nitride and polymer materials are conventionally used; therefore, because the reference (i.e. Ishige et al.) is silent on the type of the material used, any conventional equivalent material would have been usable such as silicon nitride and polymer.

With respect to claim 19, the Tham et al. reference teaches that the inductor coils 164 should be made as thick as possible but the MEM active electrode should be much thinner (see col. 9, lines 55-68). Electroplating and sacrificial layers are considered process steps that are given no patentable weight.

15. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tham et al. in view of Ishige et al. as applied above, and further in view of Bozler United States Patent No. 6,127,908.

As noted above, the Tham et al./Ishige et al. combination shows the claimed variable capacitor and inductor resonator but does not show the claimed switched inductor coil segments.

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Figure 13A of Bozler shows a variable inductor 1300 with MEM switched 1302 devices for changing the no. of active segments (see col. 12, lines 26-37).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the art-recognized equivalent variable inductor of Bozler in place of the switched inductor of Tham et al./Ishige et al. because such a modification would have been considered a mere substitution of art-recognized equivalent variable inductors.

Conclusion


16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Abidi et al. United States Patent No. 5,539,241 teaches that suspended inductors have less parasitic capacitance.
- b. Yao et al. United States Patent No. 6,074,890 discloses that suspended MEMS devices (e.g. capacitors) have less parasitic loss (col. 6, lines 66-67).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin P. Bettendorf whose telephone number is (703) 308-2780. The examiner can normally be reached on 6:00-3:30 (M-F, 1st Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert C. Pascal can be reached on (703) 308-4909. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Justin P. Bettendorf
Primary Examiner
Art Unit 2817

jpb
May 22, 2002